

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:



PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

### FOR FURTHER ACTION

See paragraph 2 below

International application No.  
PCT/JP2004/018668

International filing date (day/month/year)  
08.12.2004

Priority date (day/month/year)  
09.12.2003

International Patent Classification (IPC) or both national classification and IPC  
H01L51/30, C08G61/12

Applicant  
SHOWA DENKO K.K

#### 1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

#### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

#### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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WF20 Recd PCT/PTO 05 JUN 2006

**Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - a sequence listing
    - table(s) related to the sequence listing
  - b. format of material:
    - in written format
    - in computer readable form
  - c. time of filing/furnishing:
    - contained in the international application as filed.
    - filed together with the international application in computer readable form.
    - furnished subsequently to this Authority for the purposes of search.
3.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/JP2004/018668

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or  
industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	9-11
	No: Claims	1-8
Inventive step (IS)	Yes: Claims	
	No: Claims	1-11
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

AP20 Rec'd PCT/PTO 05 JUN 2006

**Re Item V.**

1 Reference is made to the following document:

D1 : PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) -& JP 10 140141 A (SHOWA DENKO KK), 26 May 1998 (1998-05-26)

D2: WO 87/05914 A (THE REGENTS OF THE UNIVERSITY OF CALIFORNIA) 8 October 1987 (1987-10-08)

D3: WO 01/18888 A (3M INNOVATIVE PROPERTIES COMPANY) 15 March 2001 (2001-03-15) (cited in the application)

**2 INDEPENDENT CLAIMS 1 AND 5**

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 5 is not new in the sense of Article 33(2) PCT.

2.1.1 Document D1 discloses a conductive microgel dispersion containing a self-doping conductive polymer having Broensted acid groups having a dopant function in the molecule and having a chemical structure having a sulfonated benzene ring represented by the formula 1 of D1 (wherein R<sup>1</sup> to R<sup>4</sup> are each H, or a 1-20C alkyl, alkoxy, alkyl ester, a halogen, nitro, cyano, a trihalomethyl, or phenyl group; 0.01<=m<0.5; M is H<sup>+</sup>, NR<sup>5</sup>R<sup>6</sup>R<sup>7</sup>R<sup>8</sup><sup>+</sup>, PR<sup>5</sup>R<sup>6</sup>R<sup>7</sup>R<sup>8</sup><sup>+</sup>, As<sup>5</sup>R<sup>6</sup>R<sup>7</sup>R<sup>8</sup><sup>+</sup>, Na<sup>+</sup>, Li<sup>+</sup>, or K<sup>+</sup>; and R<sup>5</sup> to R<sup>8</sup> are each H, a 1-30C alkyl, or an aryl). The microgel dispersion, which is regarded to be a coating solution, may contain at least one surfactant in order to improve its film-forming properties (e.g. applicability) in its application to an article. Said article can be any surface in the field of electronic industry and includes electrodes (i.e. anodes and cathodes) in display devices, nonlinear optics elements and others. The pH-value of the polymer in aqueous solution is between 3 and 7 (pH = 5.0, cf. par. 37, 39). Reference is made to the abstract and to paragraphs 1, 35-40, 50 and 51 of the patent application.

2.1.2 Document D2 discloses conducting self-doped polymer comprising a  $\pi$ -electron

conjugated system of monomer units along its backbone; 0.01-100 mole % of the monomers are covalently linked to a Bronsted acid, i.e. sulfonated heterocyclic rings are detailed. Also disclosed are the homo- and copolymeric, and zwitterionic forms of the polymer, the preparation of a polyaniline and of the corresponding zwitterionic polymer, and of methylthiophene-3-(2-ethanesulphonate) and -(4-butanesulphonate) for the preparation of conducting polymers. Also electrodes for use in electrochemical cells, comprising a conductive substrate coated with said polymers or their zwitterionic form is disclosed. In D2 an analogy of polyaniline self-doped polymers and polythiophene polymer derivatives is made.

2.1.3 Document D3 discloses organic electronic devices (in particular OLEDs) having a conducting self-doped polyaniline buffer layer; organic light emitting diodes with anode buffer layers comprised of conducting polymer having no mobile counterions are disclosed.

**3 INDEPENDENT CLAIM 9**

3.1 D1 does not disclose OLED devices with the abovementioned (cf. 2.1.1) polymer of 5-sulfoisothianaphthene-1,3-diyl, which has a pH value in aqueous solution between 3 and 7. Consequently, independent claims 9 - 11 represent novel subject-matter in the sense of Article 33(2) PCT.

3.2 However, claim 9 lacks inventive step in the sense of Article 33(3) PCT.

3.2.1 The objective technical problem to be solved underlying the subject-matter of the independent claim 9 consists in the provision of OLED devices with an improved stability (i.e. delay of the deterioration of the light emitting layer).

3.2.2 In D1, the improved stability of a conductive self-doped polymer layer at a pH between 3 and 7 has been demonstrated (cf. paragraph 51) and the combined teaching of D2 and D3 gives an incentive for a skilled person to exchange the

polyaniline self-doped polymer in the anode buffer layer by the 5-sulfoisothianaphthene-1,3-diyl polymer.

3.3.3 Consequently, the comparative tests provided in the present application (cf. page 34, table I) are not suitable to demonstrate any unexpected effect or property which could not be expected by a person skilled in the art.

**4 DEPENDENT CLAIMS 2-4, 6-8, 10, 11**

Dependent claims 2-4, and 6-8 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).